AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (Original) A method for producing a buried tunnel junction in a surface-emitting semi-conductor laser having an active zone with a pn-junction surrounded by a first n-doped semi-conductor layer and at least one p-doped semi-conductor layer and having a tunnel junction on the p-side of the active zone, which borders on a second n-doped semi-conductor layer, comprising:

laterally ablating tunnel junction material, by material-selective etching to a desired diameter of the tunnel junction; and

heating the semi-conductor in a suitable atmosphere until an etched gap formed by the ablating procedure is closed by mass transport from at least one semi-conductor layer bordering the tunnel junction.

2. (Original) The method according to claim 1, wherein at least one of the semi-conductor layers bordering the tunnel junction comprises a phosphide compound.

3. (Original) The method according to claim 1, wherein the suitable atmosphere comprises a phosphoric atmosphere.

4. (Original) The method according to claim 1, wherein heating is in a temperature range of about 500 to 800 °C.

5. (Original) The method according to claim 1, further comprising:

starting with an epitaxial initial structure on the surface-emitting semi-conductor laser;

sequencially applying a p-doped semi-conductor layer, the tunnel junction layer and the second n-doped semi-conductor layer on the p-side of the active zone; and

using photolithography and/or etching to form a circular or ellipsoid stamp having flanks enclosing the second n-doped semi-conductor layer and the tunnel

junction layer and extending at least to underneath the tunnel junction layer.

6. (Original) The method according to claim 1, further comprising applying an additional semi-conductor layer to the second n-doped semi-conductor layer at the p-side of the active zone, the additional semi-conductor layer bordering a third n-doped semi-conductor layer, wherein the additional semi-conductor layer is laterally ablated to a desired diameter by material-selective etching and subsequently heated in a suitable atmosphere until an etched gap formed by the ablating procedure is closed by mass transport from at least one of the semi-conductor layers bordering the additonal semi-conductor layer.

7. (Original) The method according to claim 6, wherein different semi-conductors are used for the additional semi-conductor layer and for the tunnel junction.

8. (Original) The method according to claim 7, wherein InGaAsP is used for the additional semi-conductor layer and InGaAs is used for the tunnel junction.

9. (Original) The method according to claim 6, wherein the additional semi-conductor layer is arranged in a maximum of a longitudinal electrical field, while the tunnel junction is in a minimum of the longitudinal electrical field.

10. (Original) The method according to claim 1, wherein a material-selective etching solution is H_2S0_4:H_20_2:H_2O used in a ratio of 3:1:1 to 3:1:20, if the tunnel junction is comprised of InGaAs, InGaAsP or InGaAlAs.

11-22. (Cancelled)

23. (Original) The method according to claim 1, wherein at least one of the semi-conductor layers bordering the tunnel junction comprises InP.

24. (Original) The method according to claim 1, wherein the suitable atmosphere comprises a mixture of PH_3 and hydrogen.

25. (Original) The method according to claim 1, wherein heating is in a temperature range of about 500 to 600 °C.

26. (Cancelled)